

### REMARKS

The issues outstanding in the office action mailed July 23, 2001, are the rejections under 35 U.S.C. §112 and §103. Reconsideration of these issues are in view of the following discussion, is respectfully requested.

The examiner is thanked for indicating the deficiency in the abstract, which has been corrected.

### Rejections under 35 U.S.C. §112

Claims 4-6, 8, 9, 11, 14, 15, 16 and 17 have been rejected under 35 U.S.C. §112, second paragraph. The examiner's helpful suggestions concerning preferred language in the claims are appreciated. Various clarifying amendments have been made, which do not change the scope of the claims, either literally or for purposes of the doctrine of equivalents. Withdrawal of these rejections is respectfully requested.

### Rejection under 35 U.S.C. §103

Claims 1-2, 4-5 and 7-17 have been rejected under 35 U.S.C. §103 over *Billion* '209 taken with *Walker* '768. Reconsideration of this rejection is respectfully requested.

*Billion*, commonly assigned, discloses a process for hydrogenation of heavy petroleum in the presence of an amorphous catalyst containing VIII and group VI metals, subsequently, in a second step, dehydrogenating in the presence of a supported zeolite. See column 2. The effluent of this second step is then fractionated to produce middle distillates and an oil residue. As recognized in the office action, patentees fail to teach further fractionation of the oil residue, based on viscosity index. Moreover, patentees fail to teach fractionation of the effluent from, for example, their first step, to remove gaseous effluent, and produce a liquid effluent, which is then sent to further processing. *Walker* discloses thermal diffusion in fractionation based on viscosity of an oil such as mineral oil. Patentees

prefer to take a "heart cut" of reduced pour point from this final fractionation and blend it with various viscosity index materials produced, to achieve a desired result. Thus, patentees also fail to teach an intermediate fractionation removing gaseous materials before further processing, with separation and subsequent fractionation of an oil residue (in present claim 1) and patentees fail to teach further treatment with a zeolite such as in the primary reference or present claims.

It is recognized that former dependent claim 3, reciting fractionation of the effluent from (a) to gaseous effluent, and producing liquid effluent for further treatment such as (b), was also rejected by the above combination of references further taken with *Cody* '874. *Cody* was cited in the office action for the arguable proposition, that "It would have been obvious... to remove undesirable gaseous products such as hydrogen sulfite and ammonia produced in the first stage conversion of *Billion*... because the reference of *Cody et al.* (5,911,874), illustrates that it is conventional to separate gaseous components such as hydrogen sulfite and ammonia in two stage hydro-processing." In fact, *Cody* teaches that hydro-converted raffinate from a second reactor is subjected to a separator such as a vacuum stripper to separate out low boiling products which may include hydrogen sulfite and ammonia. However, *Cody* involves a complicated seven-step process, in which such removal is conducted between a first hydro-conversion zone (the third step of the process) and a second cold hydro-finishing zone, (the fourth step of the process). It is not seen that this complicated process is comparable to that of the primary reference, nor even that the two hydro-processing steps are comparable to those of the primary reference.

In any event, it is further respectfully submitted that independent claim 18, which excludes a second treatment of effluent with hydrogen and a zeolite, is no way suggested by any of the cited references of record. For example, *Billion* requires a second step involving a support containing various active metals and zeolites Y, to produce an effluent which is then

separated into middle distillates and an oil based residue. None of the other references of record remedy this deficiency. It is noted that Claim 18 is supported under the rational of *In re Johnson*, 194 USPQ 187 (CCPA 1977), in which the Federal Circuit's predecessor court held that sufficient support to exclude an embodiment of the prior art is present where a specification indicates that applicants contemplated that embodiment, e.g., as an optional part of their invention.

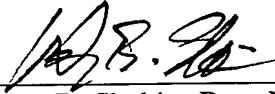
Claim 3 has also been rejected under 35 U.S.C. §103 over *Billion* taken with *Walker* and *Cody*. Since this rejection has been essentially discussed above, it is submitted that it should be withdrawn as it pertains to the present claims.

Claim 6 has also been rejected under 35 U.S.C. §103 over *Billion* taken with *Walker* and *Garwood* '177. Reconsideration of this rejection is respectfully requested. The deficiencies of the primary references are discussed above. *Garwood* does not remedy these deficiencies, and it is submitted that this rejection should also be withdrawn.

Finally, it is submitted that the references, whether singularly or in combination, do not suggest the use of dewaxing in the presence of a molecular sieve having a bridging distance of at most 0.75 Nm, or of 0.50 to 0.75 Nm. As discussed in paragraphs five and six at page seven at the presence of the specification, applicants have discovered that the use of materials having such a bridging distance, the bridging distance being defined in this portion of the specification, produces unexpected results and, thus, imparts patentability. Reconsideration of the rejections on this basis as it pertains to these claims, is also respectfully requested.

The claims in the application are submitted to be in condition for allowance. However, should the examiner make questions or comments, she is cordially invited to telephone the undersigned below.

Respectfully submitted,



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**VERSION WITH MARKINGS TO SHOW CHANGES MADE**

Claims 1-2, 4-13 have been amended as follows:

Claim 3 has been canceled.

Claims 18-19 have been added.

Abstract has been amended as follows:

1. (Amended) A process for producing oils with a high viscosity index from a feed containing constituents with boiling points of more than about 300°C ~~characterized in that:~~ comprising
- a) reacting hydrogen ~~is reacted~~ with the feed or with a mixture of the feed with at least a fraction of a stream recycled from ~~step~~ c), in the presence of a catalyst comprising at least one amorphous non zeolitic matrix and at least one metal or compound of a metal from group VIII of the periodic table and/or at least one metal from group VIB to produce an effluent;
  - a') Fractionating the effluent obtained from a) or d) in at least one separator, into at least one gaseous effluent which is evacuated and into at least one liquid effluent which is sent to b),
  - b) fractionating at least a portion of the liquid effluent obtained from ~~step~~ a) ~~is fractionated~~ so as to separate at least one oil residue comprising mainly constituents with viscosity indices which are higher than that of the feed;
  - c) fractionating at least a portion of the oil residue obtained in step b) by thermal diffusion into oil fractions with high viscosity indices and separating the oil fractions in accordance with their viscosity index.

2. (Amended) A process according to claim 1, in which ~~step b)~~ is preceded by a ~~step d)~~ for bringing at least a portion of the effluent obtained in ~~step a)~~ into contact with hydrogen in the presence of a catalyst comprising at least one zeolite, at least one matrix, and at least one metal or compound of a metal from group VIII of the periodic table and/or least one group VIB metal, the effluent obtained from ~~step d)~~ being sent to ~~step c)~~.
4. (Twice Amended) A process according to claim 2, in which at least a portion of the unconverted fractions recovered in ~~steps a)~~ or ~~d)~~ are recycled either to ~~step a)~~ or to ~~step d)~~ or partially to both ~~of said steps~~. a) and d)
5. (Twice Amended) A process according to claim 2, in which the recycle streams from ~~step c)~~ are comprising fractions from ~~step c)~~ with low viscosity indices, ~~which~~ are recycled either to ~~step a)~~ or to ~~step d)~~ or partially to both said steps.
6. (Twice Amended) A process according to claim 4, in which oil residue obtained in ~~step b)~~ and/or non-recycled fractions extracted from ~~step c)~~ are dewaxed with a catalyst or a solvent, the paraffins from this dewaxing step being recycled either to ~~step a)~~ or to ~~step d)~~ or partially to both ~~said steps~~. a) and d).
7. (Twice Amended) A process according to claim 1, in which matrix for the catalyst of ~~step a)~~ is selected from group consisting of alumina, silica, silica-aluminas, magnesia, clays and mixtures of at least two of said minerals.
8. (Twice Amended) A process according to claim 1, in which the catalyst of ~~step a)~~ comprises a total concentration of oxides of metals from group VIB and VIII in the range of about 5% to 40 % by weight, with a ratio between the metal or metals from group VIB and the metal or (metals) from group VIII, expressed as the metal oxides, of about 20 to 1 by weight.

9. (Twice Amended) A process according to claim 2, in which the zeolite for the catalyst of ~~step d~~) is an acid zeolite HY characterized by a  $\text{SiO}_2/\text{Al}_2\text{O}_3$  mole ratio in the range about 8 to 70; a sodium content which is less than about 0.15% by weight, determined using the zeolite calcined at 1100°C; a lattice parameter  $a$  of the unit cell in the range about  $24.55 \times 10^{-10}$  metres (m) to  $24.24 \times 10^{-10}$  m; a sodium ion take-up capacity  $C_{\text{Na}}$ , expressed as grams (g) of sodium per 100 g of modified zeolite, neutralised then calcined, of more than about 0.85; a specific surface area, determined by the BET method, of more than about 400  $\text{m}^2/\text{g}$  (~~square metres per gram~~); a water vapour adsorption capacity at 25°C at a partial pressure of 2.6 torrs (~~i.e., 346.63 Pa~~) of more than about 6% by weight, a pore distribution with in the range about 1% to 20% of the pore volume contained in pores with a diameter located between about  $20 \times 10^{-10}$  metres and  $80 \times 10^{-10}$  metres, the remainder of the pore volume being contained in pores with a diameter of less than  $20 \times 10^{-10}$  metres, and a zeolite mass in the range of 2% to 80 % with respect to the catalyst used in ~~step d~~).
10. (Twice Amended) A process according to claim 2, in which matrix for the catalyst of ~~step d~~) is selected from group consisting of alumina, silica, silica-aluminas, alumina-boron oxide, magnesia, silica-magnesia, zirconia, titanium oxide and clay, these compounds being used alone or as a mixture.
11. (Twice Amended) A process according to claim 2, in which the catalyst of ~~step d~~) comprises a total concentration of oxides of metals from group VIB and VIII in the range fro abut 1% to 40% by weight, the ratio between the group VIB metal (or metals) and the group VIII metal (or metals), expressed as the metal oxides, being the range about 20 to 1.25 by weight, and the concentration of phosphorous oxides being less than about 15% by weight.
12. (Twice Amended) A process according to claim 2, in which ~~step a~~) and ~~step d~~) of the process are carried out at an absolute pressure in the range about 2 to 35 MPa, a temperature in the range about 300°C to 550°C, a hourly

space velocity in the range about 0.01 to 10 h<sup>-1</sup>, in the presence of hydrogen, the H<sub>2</sub>/HC ratio being in the range about 50 to 5000 Nm<sup>3</sup>/m<sup>3</sup>, the conditions for ~~these two steps a) and d)~~ being identical or different.

- 13. (Twice Amended)** A process according to claim 1, in which ~~step c)~~ of the process is carried out in at least one thermal diffusion column with a height in the range about 0.5 to 30 metres (m), comprising two tubes placed one inside the other, the oily residue circulating in the space formed by said two tubes, the space between said two tubes being in the range from about 1 millimetre (mm) to 20 centimetres (cm); the temperature difference between the wall of the internal tube and the wall of the external tube being in the range about 25°C to 300°C, the wall of the internal tube being kept at a temperature which is less than that of the wall of the external tube.



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## ABSTRACT

A process for producing oils with high viscosity indices from oil distillates or effluents from a conversion unit comprises the following steps:

a) catalytic hydrotreatment of the feed in the presence of hydrogen and a non zeolitic catalyst;

*B1* b) fractionation of at least a portion of the effluent from step a) or step d) described below to an oil residue;

c) fractionation by thermal diffusion of at least a portion of the oil residue obtained from step b) into oil fractions with different compositions and viscosity indices.

Step b) can be preceded by a step d) for hydrocracking the effluent obtained from step a) in the presence of hydrogen and a zeolitic catalyst.

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